

**EDITORIAL:**

**Digital learning: distraction or default for the future**

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**Abstract**

Today it is not easy to think in the society without the impact (and influence) of digital technologies. The relevance of digital devices and associated indicators are used as proxies to measure the development of societies today. In that context, both top-down and/or bottom-up technology in education initiatives seek to promote different forms of incorporating digital technologies in educational contexts. There are many successful experiences around the world to implement digital technologies in school contexts. However, it is critical to analyze the mismatch between the expectations and the reality but also to enquire how to provide better evidence and analysis to deepen and expand the knowledge in the field of education and technology from the Top-Down and Bottom-Up initiatives. Keeping that in mind, an international call for papers was launched that finally 14 contributions from 12 countries were included in this special issue. The articles shed light about two important aspects: (1) how good technical solutions cannot ignore the context in which these digital technologies are being used or adopted. (2) how the access to technologies can simply amplify the existing inequalities within a society (as well as between different societies) if additional (in most cases non-technical) components are not being carefully considered.

**Keywords**

Digital learning; top-down initiatives; top-down initiatives; digital technologies; EDTECH

## I. Introduction

Over the years, the development of information and communication technologies has created waves of fervour due to the expectations of offering a “quick fix” to educational problems and improve learning performance. As from the creation of the teaching machine in the fifties (Skinner, 1960), the rapid development of digital technologies has increased this enthusiasm, opening a succession of waves where policymakers have promoted the integration of digital technologies to educational institutions (e.g. CD-ROM, PC, SmartBoards, OLPC, BYOD, Virtual Reality, etc.). A reductionist vision of digital technologies for learning, having a tendency to overlook the complexity of embracing deep transformations in education (e.g. training, pedagogies, monitoring, funding, support), and thus generating difficulties to address some of the structural problems in education (e.g. lack of funding, poor teacher training or large inequalities between learners coming from the different socio-economic backgrounds, among others).

Before the COVID-19 pandemic, the EdTechXGlobal Report (2016)<sup>1</sup> predicted that “edtech” expenditure would reach \$252bn by 2020. Although this is a booming market, medium and large-scale technology deployments in education have not fulfilled the expectations as indicated in reports from different international organizations (IADB, 2012; OECD, 2015; World Bank, 2018, UNESCO-Fazheng, 2019) and different academic research communities (Area, Alonso, Correa, et al., 2014; Selwyn, 2016; Mora, Escardíbul & Di Pietro, 2018; Sancho-Gil, Rivera-Vargas & Miño- Puigcercós, 2020) which showed poor, no correlation or even a negative correlation between the acquisition of technology (e.g. connectivity, computers, software, digital contents) and improvement in students’ performance in different standardized tests (Allsop, 2016; Stringer, Lewin & Coleman, 2019; Rivera-Vargas & Lindin, 2019).

The editors are aware that there are many successful experiences around the world to implement digital technologies in school contexts. However, we consider that it is important to make known and analyze relevant top-down and bottom-up initiatives that have not worked or have simply failed. This analysis will be examined in more detail, especially those initiatives and policies characterized by forcing a deterministic (technocratic solutionism) vision of digital technology. From the academic perspective, it is critical to analyze the mismatch between expectations and reality but also to enquire how to provide better evidence and analysis to deepen and expand knowledge in the field of education and technology. Keeping that in mind, the editors proposed in this special issue to explore the following questions:

- What has gone wrong and what lessons can be learned from existing digital education policies?
- Can the future of digital education be different? If so, how?

Attempting to examine these questions has proved to be challenging. Today it is not easy to think of society without thinking about the impact (and influence) of digital technologies. The relevance of digital devices and associated indicators (e.g. percentage of Internet penetration in the population) are used as proxies to measure the development of societies today. In that context, both top-down and/or bottom-up technology in education initiatives seek to promote different forms of incorporating digital technologies in educational contexts. That trend is unlikely to change and might continue to broaden the adoption of technological solutions. A good example of this is the current consequences of the Covid-19 pandemic that not only has heavily disrupted the education landscape at a global level but has heavily relied on the role of technologies as the “silver bullet” to solve the needs of education

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<sup>1</sup> Retrieved from: <https://www.prnewswire.com/news-releases/global-report-predicts-edtech-spend-to-reach-252bn-by-2020-580765301.html>

during a school lockdown. This special issue will take into account the current sociocultural context, aiming to achieve the following three objectives:

- Firstly, to identify and analyze from a critical and international perspective, the most common failures (and possible causes) during the implementation and adoption of digital technologies in school contexts, including both "top-down" and "bottom-up" education and technology interventions.
- Secondly, to explore alternatives or potential solutions generated in the face of these failed experiences, analyzing how to replicate (and improve) them under different conditions.
- Thirdly, to aggregate and compare a set of failing experiences of digital education interventions in school contexts, addressing educators, academics, and policymakers, but also sharing lessons learned that can be considered during future initiatives.

With these questions and objectives in mind, an international call for papers was launched. A total of 40 proposals were received. Finally, 14 contributions from 12 countries were accepted for this special issue including: Australia, Canada, Chile, Colombia, Ecuador, Malaysia, Mexico, Nigeria, Spain, UK, United States and Uruguay.

This editorial includes three other sections. Firstly, the educational context and the main theoretical and empirical antecedents that have supported this special issue are described. Secondly, an overview of the 14 academic papers are summarized. Thirdly, some closing remarks, reflections and suggestions are made about the challenges behind education and technology policy interventions as a whole, which could benefit the work conducted by policy makers, academics, school agents, and related institutions to generate and promote initiatives for the inclusion of digital technologies.

## **II. Digital learning: a critical analysis framework**

To present the main theoretical and empirical background to support this special issue, we have proposed and developed three main questions that provide a framing for the current context in which digital technology inclusion initiatives in educational contexts are designed and implemented.

### **a. Why is it important to have a critical perspective on EDTECH in both top-down and bottom-up approaches?**

Since the consolidation of the educational system in the mid-19th century, critical educational research (and also in recent years, edtech educational research) has been developed mainly through two dimensions: first, the type of initiative (top-down or bottom-up approach), and second, the investigative approach.

To comprehend from an analytical perspective the different types of education and technology initiatives, it is helpful to consider the critical works available in the field. Many of these works have emphasized the necessity to counterbalance the enthusiasm that digital technologies generated in the sector of education with a more critical analysis that highlights and counteracts the Edtech inertia, arguing for alternative forms of understanding development (Sancho, 2010; Selwyn, 2012; Biesta, 2015; Cobo, 2016; Cobo 2019).

In the top-down framework, an important part of edtech educational research has been focused on evaluating and uncovering the potential social and economic impact of Edtech through the promotion of macro policies in different regions of the world. In this way, this research is used to promote

economic development, skills development, and to enable social prosperity at a local and national level as well as at a regional and multi-national level.

In the bottom-up context, edtech educational research has been useful to show that top-down initiatives can be distanced from the reality of each local school or specific underrepresented or underserved educational communities (Assaél, Cornejo, González, Redondo, Sánchez & Sobarzo, 2011; Sisto & Fardella, 2014).

From this critical perspective, the editors also want to raise in this special issue the question of how "successful" the initiatives of digital inclusion in education are. Additionally, and perhaps more importantly, what the critical dimensions needed to define a successful policy are. As already mentioned, here it is important to enquire to what extent these top-down and bottom-up initiatives reduce or increase the socio-educational divide. Digital inclusion is a multi-dimensional phenomena (not only a technical one), and it will be important to consolidate new spaces of dialogue and exchange that enable the integration of these different perspectives to benefit individuals and prepare them both to learn how to live in the world as well as to learn how to transform the world in which they are living. A more comprehensive and balanced combination of perspectives can also provide new visions, lessons learned, and guidelines for future implementations of digital technology in different educational contexts.

### **The type of initiatives implemented**

These can be promoted from an institutional framework (e.g. top-Down or from the central administration to the districts or the schools), but also, by the actors themselves in local contexts and daily practices (e.g. bottom-up or community driven initiatives that are aggregated and adopted at the central level). Both dimensions have grouped together a set of experiences, coupled with evidence of efforts to transform or reproduce, but also to explain or understand the dynamics of the educational system over the years.

Top-down edtech initiatives tend to be designed as large-scale policies and the goal most likely emphasizes the necessity of providing digital technologies to large volumes of students (or teachers). However, access to ICTs, and in general, the emergence of the digital society has not been equally beneficial for all, and this distinction has affected some regions more than others (World Bank, 2018). Furthermore, techno-deterministic discourses on the potential of digital technology have predominated in different parts of the world. For instance, public policies during the 2000s began to promote the creation, endowment and massive deployment of '1:1' distribution of technological resources in schools and educational communities, in order to expand access to the digital society and to benefit a wider and less advantaged segment of the population. Most of these initiatives were launched due to the global prominence of the MediaLab-MIT-led 'One Laptop Per Child' program. In Europe, the European Commission financially encouraged different member countries to invest and support the introduction of digital technology in schools through the 1:1 model. Agencies such as European Schoolnet (EUN) drove these policies (Balanskat et al. 2013). The main criticisms regarding the design of these (inter)national programs was that the prevailing focus on digital devices and connectivity disregarded the specificity of each context (and its specific challenges and constraints) as well as the complexity of the school culture (Warschauer and Ames 2010; Area 2011; Andersson, et al. 2014). Others authors have also questioned the commercially-driven direction that these interventions took (Selwyn and Facer 2013; Zheng et al. 2016). With some exceptions (Cobo & Rivera-Vargas, 2019), the majority of EdTech initiatives have not persisted (Balanskat et al. 2013; Area et al. 2014).

Bottom-up initiatives allow us to visualize how local educational actors generate initiatives that emerge from the context in which the communities are located, or from a very specific interest (or a

very particular requirement) to a broader sector of society. The majority of these initiatives have been introduced by schools, companies and foundations following the objective of including digital technology in learning environments. Beyond this, the bottom-up initiatives have also reflected the tension between the global economic, political, cultural and social framework and grassroots initiatives of technology policies implemented in local contexts. (Cummings et al. 2018).

Furthermore, bottom-up initiatives have given visibility to the transformative potential of schools. For example, authors such as Engeström (2016) through the "transforming agency", Stetsenko (2019) through the "radical-transformative agency", Lipman (2011), through the "activist approach to educational transformation", Herrington, et al. (2014) through "Authentic learning", and Erstad, Miño-Puigcercós & Rivera-Vargas (2020) through "Transformative agency and digital connectedness", have emphasized the risks of reproducing a compulsive and meaningless use of educational practices mediated by digital technologies in local school contexts. Their research, carried out in different schools in Australia, Chile, Finland, Mexico, Norway, Spain, United States, UK (and others), reveal some aspects that can help enhance the transforming role of the school, along with the involvement of the student body in their own learning processes:

- Self-managed and critical use of digital technologies in the classroom
- Connect the school curriculum with social problems and everyday life
- Give greater autonomy to schools to manage their own organizational and educational projects

### **Investigative approach**

As for the research approach, since digital technologies emerged and spread within the educational system, the necessity to observe and understand different realities has intensified. Although the prevalence of the broad, economic and structural perspective of social and educational phenomena is evident, investigating contexts and practices is essential to reveal the behaviours and involvement of participants. Specifically, there have been many top-down policies or initiatives whose evaluations have reflected important achievements on a large scale, however in contrast, they were unable to identify the evident inequalities and gaps in time. These high-level perspectives have, in many cases, failed to recognize or understand the specificities of participants in a particular contextual or reality (Selwyn, 2013; Area, Alonso, Correa, et al., 2014; Andersson, et al. 2014).

### **b. Why the broad enthusiasm on Edtech to solve the problems of education?**

Attempts to pitch educational technology (by both commercial companies and early adopters) as a universal solution to the problems of education, have largely been unsuccessful (Sancho-Gil, Rivera-Vargas & Miño-Puigcercós, 2020). A recent example was the hype that once surrounded the 1:1 initiatives in primary and secondary education, previously described, or the development of virtual campuses in higher education institutions. Along with the enthusiasm of the Massive Open Online Courses (or MOOCs), came the excitement of the virtual campuses. However, the criticism is not only of the excessive enthusiasm, as well as lack of strategic planning when purchasing and deploying these technological solutions, but also of when and how they are used. Likely the greatest contest both for educational technology vendors and for early adopting teachers is the challenge of adoption (at scale) of any new technology. At the root of the problem of technology utopia is a belief that the tool will lead to a better life regardless of the context of the learner. Traditionally, technology developers have often ignored context, seeking a type of device that can be sold in large volumes regardless of the context or the culture of the one who adopts these tools.

Techno utopian views and enthusiastic claims of educational technology vendors and pundits need to be confronted and challenged by data from actual use. Given the distributed nature of the distance education context, students' and teachers' practices while using technology are often under-represented in the agenda of different Edtech research. Nonetheless as Selwyn (2010) notes, "greater attention now needs to be paid to how digital technologies are actually being used– for better or for worse – in 'real-world' educational settings" (2010, p. 66).

Although the impact of technology in education needs to be better understood and the enthusiasm somewhat more measured, the role of digital technologies in education is expected to keep growing. Not only long-term interventions that are continuous over time are required to be developed but also ensuring that there are a number of critical technical and non-technical factors to be taken into consideration. It will require, for instance, effective public policies (e.g. infrastructure, funding, training, etc.) to ensure that teachers and school managers receive permanent and appropriate support from the public administration as well as from other key stakeholders such as platform and content providers, training on the pedagogical use of technologies, as well as support for the effective use of educational management information systems, among others.

Although critical, the introduction of digital technologies into the educational context requires much more than connectivity and devices. As the evidence indicates (Omidyar-Network, 2019), there is a notable need for more and improved digital educational policies to define the minimum conditions required to enable technology to effectively support learning. It is likely that techno-utopians and enthusiasts would argue that the pandemic has become the "renaissance" of Edtech and now the plans and promises will be finally accomplished. This waits to be seen.

### **c. What can we learn from the evidence?**

The last twenty years of research have shown that under appropriate conditions, information and communication technologies (ICT) can make a valuable contribution to improve educational outputs. Some of the most typically anticipated outcomes of technology in education are (Foundation Kennisnet, 2015): to provide better learning outcomes; to support school management; to leverage equity and scalability reducing the costs of communication and content delivery; to increase the development of cognitive skills (both foundational and higher-order) as well as socio-emotional ones; to increase students' engagement; to support teachers pedagogical strategies; to better connect the school with the world outside the formal education context, among others.

Existing research provides growing evidence that ICT – when its use is effectual, targeted, and controlled – contributes to a more appealing, effective and efficient education. However, the risk of focusing only on the outputs and ignoring the inputs and some of the basic conditions needed for an appropriate integration of technology into the education systems (cfr. Education Endowment Foundation, 2019). Evidence also shows that in different countries, educational technology is used by only a limited number of students or by a small minority of teachers (with uneven results). It is well known that simply replacing paper with an electronic screen makes it difficult to expect transformations in the learning experience. Poor access to the Internet in schools or limited knowledge on how to integrate these tools to enhance the learning experience are also some of the more frequent challenges. (Pamuk et al., 2013).

Another important aspect is that different studies consistently find that digital technology is associated with moderate learning gains (Selwyn, 2016). One lesson learned from those studies is that technology should be used to supplement teaching, rather than replacing it (Rivera-Vargas & Cobo, 2019). It is unlikely that particular technologies will bring changes in learning directly, but some have the potential to enable changes in teaching and learning interactions (Venegas & Westermann, 2019);

Education Endowment Foundation, 2019). Effective use of digital technology is driven by learning and teaching goals rather than a specific technology. New technology does not automatically lead to increased attainment. Students' motivation to use technology does not always translate into more effective learning, particularly if the use of technology and the desired learning outcomes are not closely aligned (Stornaiuolo, et al., 2017).

With regard to the teachers, the evidence shows that they need support and time to learn to use new technology effectively. This involves more than just learning about how to use the hardware or software; training should also support teachers in understanding how it can be used for learning (Rivera-Vargas, Sancho-Gil & Sánchez, 2017). When education and technology achieve the expected outcomes, and this is just in specific (exceptional) cases, it is observed that teachers are appropriately trained so that they know how to use technology to improve their teaching practices (Mercader & Gairín, 2020). In some countries, a significant effort has been made to introduce laptops or other devices into classroom. Similar endeavors have been made to connect the schools and even those in rural areas, but teachers still need the training and the support required in order to make the best use of technology and improve student outcomes (Mckay, 2016). The outcomes are negative if only devices are introduced to the classroom and teachers are not trained on the proper use of technology. Here it is important to add that training on how to interact with the technology itself cannot be limited to learning, but also how to improve and transform teaching practices (OCDE, 2019).

However, some studies might argue that teachers are not necessarily familiar with the pedagogical integration of digital technologies. This is definitely not the only constraint. One of the main challenges remains in pedagogical strategies, for instance, learning how to integrate the technology to develop more individualized teaching and to develop new teaching practices that are more innovative and suitable for the learning context (Coll & Rivera-Vargas, 2019).

One recent and relevant source of information is the previously mentioned International Computer and Information Literacy Study (Frailon, et al., 2018). This study included the participation of over 46,000 students and 26,000 teachers from twelve countries and two benchmarking educational systems. The study gathered background information about students' and teachers' use of, and the institutional and policy context of their respective education and technology policies. For instance, some of the more relevant characteristics of the educational systems across participating ICILS 2018 countries are:

- A. In 11 of the 14 ICILS 2018 educational systems, the national educational ministry led the primary role of defining the goals and direction for the school education system.
- B. In almost all countries, schools had at least some autonomy with most aspects of school policies (with private schools typically having a greater degree of autonomy).
- C. Although the formulation of plans and policies supporting the use of ICT in education differed across countries, there was a high degree of similarity in the content related to improving student learning, ICT resources, methods to support student learning, and the priorities for the use of ICT.
- D. Countries had very different approaches to the development of their teachers' capacities to use ICT. In most countries, it was either a mandatory component of pre-service education or part of some form of professional development for teachers. ICT proficiency was rarely a requirement for registration as a teacher. In general, countries provided a large degree of support for teacher access to ICT-based professional development, mainly by funding teacher participation in programs and/or by providing resources for teachers to access.
- E. Most technology-related resources and software-related resources were reported as being available in schools.

In general terms, if teachers lack the necessary skills to be able to use the Internet, let alone use ICT in support of their pedagogical practices, technologies will not be a driver of change in the classroom. "The main mistake made in public policies for training teachers in ICT is the premise that digital literacy is merely a set of technical skills, which is not conducive to real innovation" (CETIC, 2018). Digital skills (technological and pedagogical ones) are not only developed by formal training but also supported by teachers when they create a network of peers, which prove to be a powerful source of guidance and support, as well as an opportunity to overcome the isolation that they might feel in classrooms (Redecker, 2017).

Better understanding of how education systems can become more responsive to changes in society is needed so they can equip people with the right knowledge and skills. That means having an updated and multidimensional understanding of what impacts can be expected when integrating technology in the classrooms. The evidence shows that in many countries a significant effort has been made to introduce technology into the classrooms. However, contrary to different expectations, what is observed is that introducing technology in the classroom by itself not only does not improve student outcomes, it can actually have a negative impact on student learning. Simply incorporating technology does not guarantee an impact on learning. In many cases, technology can simply reinforce traditional teaching and learning practices (Vegas et al, 2019).

### **III. Special issue structure**

As mentioned in the introduction, this special issue was organized based on three central dimensions: bottom-up initiatives, top-down initiatives and cross critical perspectives. This approach allowed us to explore and learn about proposals for digital inclusion in different territorial contexts and with different purposes. Regarding the bottom-up dimension, three local experiences carried out in school contexts were included. In relation to the top-down dimension, eight experiences of analysis of the implementation and impact of large-scale digital inclusion educational policies were added. And finally, regarding the cross critical analysis, three works that analyzed specific topics closely linked to the issues raised in this special issue were included.

#### **a. Articles included in the special issue**

For the initial call for papers (first phase), 40 proposals from different continents, regions and intellectual and political traditions were received. In the second phase, and after the respective peer evaluation, 14 of these contributions were selected and included in this special issue. The distribution of these works in the three dimensions described was as follows:

#### **Bottom-up dimension**

The first article is entitled "The 'obvious' stuff: exploring the mundane realities of students' digital technology use in school" by Neil Selwyn, Selena Nemorin, Scott Bulfin and Nicola Johnson. This paper explores the ways in which students perceive digital technology as being helpful and/or useful to their schooling. Through a survey data from students (n=1174) across three Australian high schools, the authors concluded that educationalists need to temper enthusiasm for what might be achieved through digital technologies, and instead develop better understanding of the realities of students' instrumentally-driven uses of digital technology.



The second article is entitled "The digital transformation of schools. Obstacles and resistances" by Manuel Area-Moreira, Pablo Santana Bonilla and Ana Sanabria-Mesa. This article presents the results of a case study on 40 primary and secondary Canarian (Spain) state schools undertaken to analyze the level of pedagogical and organizational integration of digital technologies in each one of them. The result shows the shortage of devices for students and teachers; limited connectivity; the instability of the faculty; the lack of leadership that will drive the use of ICT in the school; and the lack of a shared vision of the school management team about the educational potential of ICT.

The third article is entitled "Investigating Digital Distraction among Pre-service Science, Technology, and Mathematics Teachers in Nigeria", by Adeneye Awofala, Oladiran Olabiyi, Racheal Okunuga, Omolabake Ojo, Awoyemi Awofala and Abisola Lawani. This article presents the results of a quantitative research about digital distraction scale among pre-service science, technology and mathematics (STEAM) teachers in Nigeria. The results showed a high level of digital distraction among the pre-service STEAM teachers in Nigeria. The digital distraction is composed of several connected yet distinctive factors (emotional distraction, digital addiction, and distraction by procrastination).

### **Top-down dimension**

The fourth article is entitled: "Beyond cybersafety: The need to develop social media literacies in pre-teens" by Luci Pangrazio, Lourdes Cardozo-Gaibisso. In this article, based on a reporting on the digital practices of 276 pre-teens aged 7-12 years in Australia and Uruguay, the authors contend that the everyday digital challenges young people face are now beyond the scope of most cybersafety programs. In the same line, the authors argue that is time for schools to move beyond the cybersafety discourse to encourage students to think more critically about the digital media they use.

The fifth article is entitled "Practices and discourses of Chilean academics: local lessons to address the digital shift in academic management", by Carla Fardella, Enrique Baleriola and Giazú Enciso. This article presents the results of 40 interviews with academics about their experience and engagement with digital management devices and platforms (DMDs) in the framework of the management logic known as New Public Management (NPM). The results point to the existence of at least three repertoires: 1) device-lover, 2) functional-pragmatic and 3) oppositionist-rejector. Together, these results point out that, on one hand, both the experience and the identity of the academic; and on the other hand, the relationship with the institutional context; both are the key to the successful implementation of the DMDs.

The sixth article is titled: "Four decades of policies to integrate digital technologies in the classroom in Catalonia: actions, achievements and failures" by Begoña Gros, Joan-Anton Sánchez Sánchez, Iolanda García and Cristina Alonso. In this paper, the authors put the focus on the analysis of digital inclusion initiatives promoted by the Government of Catalonia from the 80s to the present taking into account the international studies about digital education. Numerous initiatives and programs have been supported in Catalonia over the years without, in many cases, a lack of continuity and evaluation of the results obtained. However, the new initiatives on digital education in Catalonia open new expectations linked with the improvement of education and not only focused on the use of digital technologies.

The seventh article is entitled "The end of Enlaces: 25 years of an ICT education policy in Chile", by Magdalena Claro and Ignacio Jara. This article analyzes the reasons behind the end of the ICT in education policy (Enlaces) driven by the Chilean Ministry of Education for 25 years. The argument is that the institution that sought to give sustainability to this policy over time, ended up losing its ability to lead relevant responses to the educational challenges posed by the growing digitalization of the Chilean society. To develop this argument, first the authors describe the main characteristics, history

and results of Enlaces until 2018, and second, they analyze the institutional development of Enlaces in light of the challenges posed to ICT in education policies in the world.

The eighth article is entitled: "Appropriation of ICT in the educational field: approach to public policy in Colombia years 2000-201" by Diego Barragán Giraldo and Juan Amador Báquiro. In this work is presented an analysis about the Colombian public policy related to the ICTs in the educational field during the period of 2000-2019. Through an analysis of relevant documents and interviews with experts, the study concludes that, despite the investment made in connectivity and equipment provisioning, public policy has not transformed the practices of educational actors.

The ninth article is entitled: "Pending issues from digital inclusion in Ecuador: challenges for public policy, programs and projects developed and ICT-mediated teacher training", by Diego Apolo, Malena Melo, Johe Solano and Felipe Aliaga-Sáez. This study is based on a qualitative approach that, through documentary research, bibliographic analysis and critical review of literature, can generate contributions that allow the identification of challenges and possible gaps to be faced by government entities in Ecuador when proposing actions that link education and technology.

The tenth article is entitled "Lessons from the Training and Support of Teachers in the Development of Digital Skills: A case study of @prende 2.0", by Ana Franzoni Velázquez, Maria Cardenas Peralta and José Mandujano Canto. This article looks at a recent effort of the Mexican government (2012-2018) to address the issue of teacher training and support. @prende 2.0 was a program of the Mexican federal government that involved 2,700 digital trainers who trained more than 63,000 teachers in the use of technological equipment that they would be provided. Analyzing administration information and hard data from @prende, this article analyzes the program's successes and challenges to fashion a series of recommendations regarding similar training and support efforts.

The eleventh article is entitled: "Technology adoption in Malaysian schools: An analysis of national ICT in education policy initiatives", by Azlin Zaiti Zainal and Siti Zaidah Zainuddin. Through a discourse analysis approach, this paper aims to examine the research studies on large-scale initiatives introduced to digitize the Malaysian education system, from the Smart Schools program to the incorporation of the Frog Virtual Learning Environment (VLE) in the classroom. The rationale behind these top-down initiatives and how they affected the stakeholders at the micro level, namely, teachers and students, are reviewed and analyzed. The analysis shows the factors that could contribute to the successful and unsuccessful implementation of these initiatives and guide the planning of future policies.

### **Cross-critical analysis**

The twelfth article is entitled "Digital technology as a trigger for learning: promises and realities" by Juana Sancho-Gil. In this paper, the author discusses first, the fact that more and more we refer to digital technology as just "technology", as if the rest of the many organizational, symbolic, artefactual and biotechnological developments were something "natural". Second, the author discusses the rise and spread of technological solutionism in education and a growing discourse that sees every new digital technology as the panacea to solve the problems of education. Third, the author analyzes the collateral effects of this discourse in the educational practice, with an especial reference to persuasive technologies and Big Data. The article concludes with the request and the need for researchers, practitioners and education policy makers to avoid the temptation to solve a deeply "wicked" problem such as education with simple solutions.

The thirteenth article is entitled "A Critical look at Educational Technology from a Distance Education Perspective", by Terry Anderson and Pablo Rivera-Vargas. This article focuses on educational

technology as applied in the context of programs and institutions that offer completely distance education courses. This paper focuses on two questions: (1) What aspects have not been completely satisfactory in the transit and transformation that education has undergone, from its more traditional, campus-based conception, towards its new configuration marked by the continuous use of digital technologies and environments? (2) What are the future challenges that distance education must deal with to support sustainability of this teaching model? From a theoretical and interpretative analysis, based on the review of relevant articles and documents on distance education, some critical dimensions (limitations, shortcomings and future challenges) about the use of digital technologies in distance education are identified and subsequently analyzed. These dimensions evidence how the initial (sometimes excessive) promises of digital technologies in distance education haven't (yet) been fully reflected in reality.

Finally the fourteenth article is the epilogue of this special issue, and is entitled "Epilogue: Rethinking digital literacy: Media education in the age of digital capitalism", by David Buckingham. This article is a reflection of the author where he suggests that we need to move beyond a binary view of digital media as offering risks and opportunities for young people, and the narrow ideas of digital skills and internet safety to which it gives rise. The article proposes that we should take a broader and more critical approach to the rise of 'digital capitalism', and to the ubiquity of digital media in everyday life. In this sense, the paper argues that the well-established conceptual framework and pedagogical strategies of media education can and should be extended to meet the new challenges posed by digital and social media.

#### **IV. Final remarks**

In relation to the questions that we have explored with this special issue, we can state the following:

*What has gone wrong and what lessons can be learned from existing digital education policies?* Adding a layer of technology into an existing educational system has not proven to be effective at transforming or enhancing learning opportunities. Years of experience, consistent research, as well as the articles presented in this special issue emphasize the necessity of adopting a more comprehensive and flexible Edtech intervention (effectively combining top-down and bottom-up approaches). Interestingly, despite the rapid development of technologies, and the accelerated change that they embraced, it is not all that clear to what extent technology can (or cannot) really be an agent of transformation. Furthermore, lacking a strategic Edtech vision can amplify the gaps between educational systems, affecting those who are living in the most challenging environments.

Regarding lessons learned, from the evidence presented in these articles, we consider it to be important to look beyond the debate about the effect of generic technology use on learning and open space for less techno-centric questions. In this vein, we could have more and better research about the kinds of technologies people are using, who is using them, and how.

Another important lesson learned refers to the relevance and usefulness of learning from other countries' education and technology experiences and policies. Traditionally education has been seen as a national policy but since international comparative studies have gained increasing relevance, countries have realized that they may think that they are doing well compared to the past for example, but when they compare themselves to other countries, they find that they are not doing as well as they thought. It is becoming more widespread that countries realize that it is important that their educational systems can learn from other countries and experiences. However, it is important not to underestimate the complexity of any policy implementation. Simply by "replicating" foreign policy

from one context and applying it directly to another, assuming that it will have the same effect, will probably not provide the expected outcomes. Educational technology policies are significantly context-dependent and bottom-up perspectives should also dialogue with the high-level visions and policies; these aspects are considered critical to be kept in mind when making policy recommendations adopting from different governments (OCDE, 2019).

As the different articles in this monograph shows, in many countries, policies of education and technology have been implemented to bypass, replace (displace) or diminish the role of educators or teachers. However, the evidence also indicates that an effective use of technologies in formal education is strongly associated with the active engagement of teachers within the learning experience (regardless if the technology is used within or outside formal education). An important lesson could be learned. It is widely emphasized that these digital tools in many cases can reduce costs and increase efficiency in the delivery of content. Access to educational contents cannot equal learning (it is an important factor but certainly not enough). This means that if digital technologies are simply considered as a repository (for content delivery), the potential of enabling connection, interaction, negotiation between many users is, in many cases, undermined or simply not well understood, therefore education is not necessarily improved. Once again, it leaves the promises of technologies in education unfulfilled.

*Can the future of digital education be different? If so, how?* Perhaps today, there is more evidence to understand the necessity of adopting a more comprehensive and complex approach, where technology has to be aligned with a number of critical dimensions such as understanding the context and its necessities, prioritising the human infrastructure and keeping in mind that those who are using the technology at the end of the day are complex systems of individuals who might need more than keyboards and screens to transform the educational system. The 2019-20 pandemic has highlighted the level of protagonism of digital technologies in the current understanding of modern educational systems. However, just like in the past, simply incorporating technology might not lead to an improvement in learning or transformative practice. Digital technologies interventions should not be considered as a “one-size-fits-all solution” and thus ignoring who, where, how and why these tools are being adopted.

Unlike the Big Tech and especially the global providers of social networks that have been rapidly reaching a large sector of the global Internet market (under a handful of global technological players and techno-solutions), in the case of technologies for learning, the situation seems to be different, where scalability cannot undermine context. If there is not a clear understanding of the context, the characteristics and the needs of the communities where these technologies are used (e.g. socio-economic reality, culture, language, geographical location, existing competence or perceptions), it is very unlikely that the adoption of technology will be equally effective in different places and latitudes.

Education is not a transactional phenomenon but a relational one. That means understanding that good technical solutions cannot ignore the context in which these tools are being used or adopted. Digital technologies are described as “neutral”; however, technologies represent a form of understanding cultural systems, benefiting some groups and societies, among others. In other words, digital technologies can be helpful in supporting learning, but they also can end up amplifying existing inequalities. One example of that could be what we call “digital ignorance” (e.g. the capacity to understand and determine if information is reliable or trustworthy or not, or knowing how to make effective use of technologies, for instance, to protect personal data and privacy). This digital ignorance might persist regardless of the access to technologies. That means the access to technologies can simply amplify the existing inequalities within a society (as well as between different societies), if additional (in most cases non-technical) components are not carefully considered.

Undoubtedly, the coronavirus (COVID-19) has opened a new chapter in the global context of Edtech (this special issue is published in the middle of this crisis). The suspension of face-to-face educational activity at all levels of education (among many serious social and economic consequences) derived from this pandemic, have placed governments in a situation of manifesting their instability and uncertainty. The reopening of the educational system and its continuity through virtual environments, has become a political and economic priority. It is expected that technology vendors will be ready to sell their services to governments, given the pressure to reactivate classes. The complexity of the current situation leaves the public administrations in a vulnerable situation or at least in a state of urgency. Hopefully, the lessons documented and described in this special issue could be of help in learning the lessons of the past.

Presumably during the next few years, school education in the world will become increasingly more technological, moving largely toward virtual environments. This will be uncharted territory (especially in primary and secondary education). Remedial and inclusive actions will be needed during the design and implementation of the coming Edtech educational policies, to avoid expanding the existing inequalities.

Hopefully, the lessons learned from all the experiences described in this special issue can be capitalized upon. If the post COVID-19 period happens to be the "renaissance" of Edtech, as some claim, governments will need to be more prepared than ever to implement the right kind of policies.

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